

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
29 November 2001 (29.11.2001)

PCT

(10) International Publication Number
WO 01/89867 A1

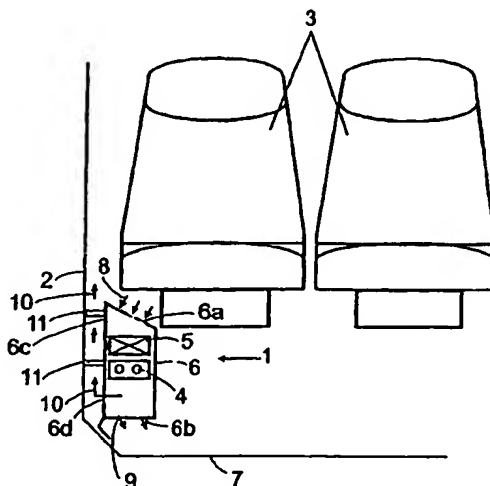
- (51) International Patent Classification⁷: **B60H 1/00** (74) Agents: **WILLQUIST, Bo et al.**; Willquist & Partners
Patentbyrå AB, Platensgatan 9C, S-582 20 Linköping (SE).
- (21) International Application Number: **PCT/SE01/01106**
- (22) International Filing Date: **17 May 2001 (17.05.2001)**
- (25) Filing Language: **Swedish**
- (26) Publication Language: **English**
- (30) Priority Data:
0001958-8 **25 May 2000 (25.05.2000) SE**
- (63) Related by continuation (CON) or continuation-in-part (CIP) to earlier application:
US Not furnished (CIP)
Filed on Not furnished
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KB, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- (71) Applicant (*for all designated States except US*): **UWE VERKEN AB [SE/SE]**; Box 262, S-601 04 Norrköping (SE).
- (72) Inventor; and
- (75) Inventor/Applicant (*for US only*): **KARLSSON, Tomas [SE/SE]**; Lindbyvägen 9, S-616 30 Åby (SE).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **DEVICE AT A HEATING FAN**



(57) Abstract: The invention relates to an arrangement in a heating fan (1). The fan comprises an elongated casing (6) and in this a heat exchanger (4) and fan element (5) are designed to draw in ambient air through the openings (6a) along one side of the casing (6). After heating in the heat exchanger (4) the air is allowed to pass out through openings (6b) along the opposite side of the casing (6). The heating fan (1) is intended for wall mounting horizontally in an area close to the floor (7) in a bus. The inlet openings (6a) then point upwards and the outlet openings (6b) downwards. The casing (6), on the side (6c) intended to be fitted towards the bus wall (2), along at least one part of its length has at least one opening (6d) located on this side at the bottom. Through this opening a proportion (10) of the air heated by the heat exchanger (4) passes upwards along the wall (2) on which the heating fan (1) is mounted.

WO 01/89867 A1

Device at a heating fan

The present invention relates to an arrangement according to the pre-characterising clause of the patent claims attached.

Although the heat balance in an enclosed space, such as a bus, is normal, the temperature of the interior climate may be felt to be unsatisfactory. One reason for complaints are draughts, another reason being so-called temperature radiation asymmetry.

The term "draught" refers to a local cooling of the skin caused by air movements. It has been possible to establish through experiments that if the temperature of the surrounding air is increased commensurately with an increase in the air velocity, relatively high air velocities can be tolerated without serious discomfort.

As bus passengers, we consequently feel it is something of an advantage if there is a certain draught on a hot summer's day.

It is quite a different matter if one lingers close to a cold surface such as a cold wall or window or close to a warm surface for a longer period. It may be observed that persons generally experience some thermal discomfort in the event of cold radiating from the side or heat radiating from above. By contrast, we can tolerate large variations in cold radiating from above and heat radiating from the side.

This is one reason why in known heating fans of the type mentioned in the introductory part the heated air is expelled low down, that is to say near the floor.

The object of the present invention is to achieve improved comfort in a heating fan of the type stated in the introductory part. This is achieved in that the invention has the features specified in the characterising part of the claim.

The invention will be explained in more detail with reference to the attached drawing, which in diagrammatic form shows a cross-section through a heating fan according to the invention installed in a bus.

In the drawing 1 generally denotes a heating fan fitted to the wall 2 of a bus, for example under or between the passenger seats 3. The heating fan 1 comprises an elongated heat exchanger 4, which in a manner known in the art constitutes the pipe

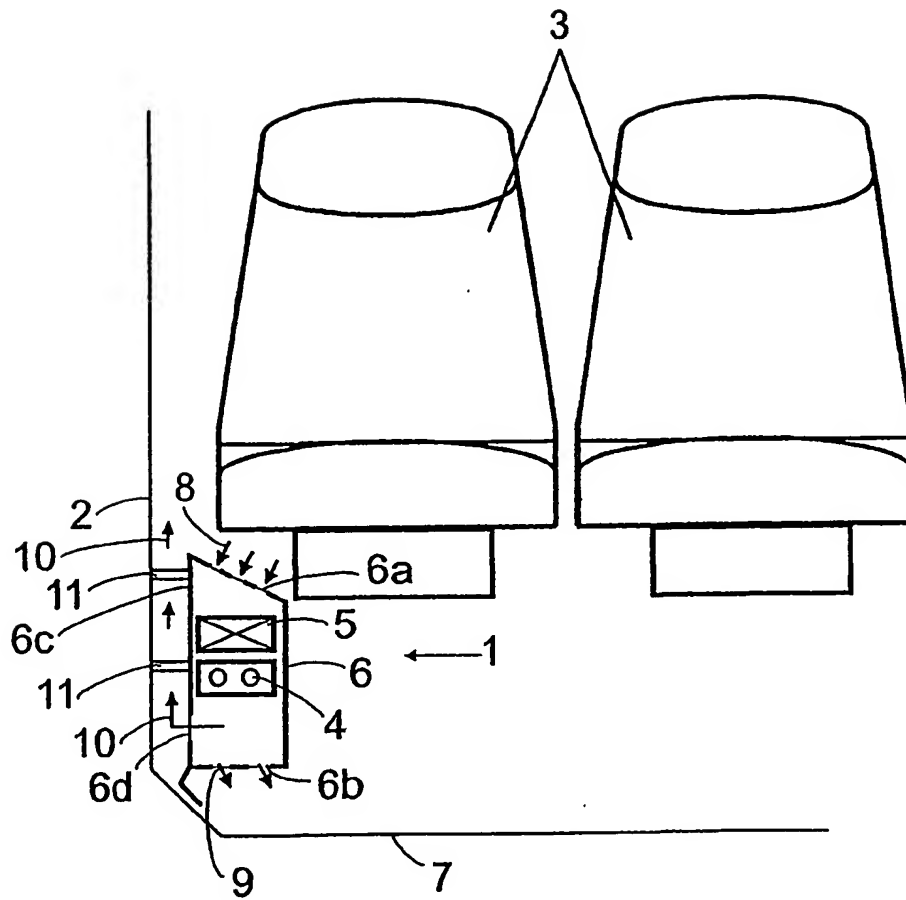
connection to the bus heating system. In the drawing a number of fans 5 are arranged along and above the heat exchanger 4, but it will be obvious that the location and the number of fans may be varied without departing from the scope of the invention.

- 5 The heat exchanger 4 and the fans 5 are enclosed in a casing 6. This is provided along its length with openings 6a, 6b arranged at the top and bottom. The fans are designed to draw air in through the openings 6a at the top, to allow it to pass through the heat exchanger 4 and to expel the air thus heated out through the openings 6b at the bottom near the floor 7 of the bus. In the drawing the intake air to the heating fan
10 1 is marked by arrows 8 and the heated air from the heating fan 1 by arrows 9.

- According to the invention the casing 6, along at least one part of its length on one side 6c intended to face the wall 2 of the bus, has at least one opening 6d at the bottom. The said opening 6d is designed to allow a proportion of the air heated by the
15 heat exchanger 4 to flow upwards along the wall 2. This proportion of heated air is marked by arrows denoted by 10. As stated in the introductory part, this heating of the wall 2 constitutes compensation for the equivalent temperature reduction as a result of the admission air to the heating fan. In order to ensure a certain gap between the heating fan 1 and the bus wall 2, there is a spacer element 11 on the side 6c
20 of the casing 6.

Claims

1. An arrangement in a heating fan (1) comprising an elongated casing (6) and in this a heat exchanger (4) and fan element (5) designed to draw in ambient air through the openings (6a) along one side of the casing (6), which air after heating in the heat exchanger (4) is allowed to pass out through openings (6b) along the opposite side of the casing (6), the heating fan (1) being intended for wall mounting horizontally in an area close to the floor (7) in a bus, with the inlet openings (6a) pointing upwards and the outlet openings (6b) downwards, characterised in that the casing (6), on the side (6c) intended to be fitted towards the bus wall (2), along at least one part of its length has at least one opening (6d) located on this side (6c) at the bottom, through which opening a proportion (10) of the air heated by the heat exchanger (4) is intended to pass upwards along the wall (2) on which the heating fan (1) is mounted.
2. The arrangement according to Claim 1, characterised in that on the side (6c) there is a spacer element (11), the function of which is to ensure a gap between the heating fan (1) and the bus wall (2).



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/01106

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60H 1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B60H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 3041710 A1 (DAIMLER-BENZ AG), 22 July 1982 (22.07.82)	1
	--	
A	SE 467172 B (KLIMATSYSTEM ORIGINAL AB), 2 April 1988 (02.04.88)	1
	--	
A	BE 887803 A (AURORA KONRAD G SCHULTZ), 5 March 1981 (05.03.81)	1
	--	
A	DD 122351 A (JURSHIK DIETER), 5 October 1976 (05.10.76)	1
	--	

☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

* Special categories of cited documents

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

21 August 2001

Date of mailing of the international search report

91-08-2001

Name and mailing address of the ISA:

 Swedish Patent Office
 Box 5055, S-102 42 STOCKHOLM
 Facsimile No. +46 8 666 02 86

Authorized officer

 Göran Carlström/EK
 Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT
Information on patent family members

02/08/01

International application No.
PCT/SE 01/01106

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
DE	3041710	A1	22/07/82	SE 440468 B,C SE 8106530 A	05/08/85 06/05/82
SE	467172	B	02/04/88	FI 89690 B,C FI 874298 A SE 8604172 A SE 8705173 A	30/07/93 02/04/88 02/04/88 02/04/88
BE	887803	A	05/03/81	DE 8202127 U	16/09/82
DD	122351	A	05/10/76	NONE	